

Chapter 11: The Everglades Stormwater Program

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SUMMARY OF LAST YEAR'S REPORT

Chapter 11 of the *2000 Everglades Consolidated Report* provided a detailed description of the history of the Everglades Stormwater Program (ESP) and the individual elements that make up the program. Chapter 11 first described Everglades Forever Act (Act) regulatory mandates and specifically, the Non-Everglades Construction Project (Non-ECP) permit (File No. 06, 502590709) that was issued by Florida Department of Environmental Protection (Department) pursuant to subsection 9(k) of the Act for all structures discharging into, within and from the Everglades Protection Area that were not included in the Act's permit(s) for the Everglades Construction Project. It was further explained in Chapter 11 that the ESP was created to provide technical and administrative support for the development and implementation of the strategies identified in the Non-ECP permit that ensure that state water quality standards will be achieved and maintained, to the maximum extent practicable, by December 31, 2006. Finally, a detailed update was provided on the progress of implementation of the various elements for ESP contributory basins.

The Non-ECP permit conditions require the South Florida Water Management District (District) to document the accuracy of the data collected and to measure progress toward achieving and maintaining compliance with state water quality standards. To fulfill permit conditions, Chapter 4 of the *2000 Everglades Consolidated Report* included a comparison of quality assured water quality data at Non-ECP structures to state water quality standards from May 1, 1998 through April 30, 1999. The analysis found that for ESP contributing basins and structures, other than for dissolved oxygen, there were very few excursions from Class III numeric water quality criterion for any parameter. It was indicated in Chapter 11 that the District would continue to monitor water quality in accordance with the Non-ECP permit and also pursue the implementation of new or improved water quality monitoring programs in contributing basins upstream of direct "INTO" structures.

Finally, Chapter 11 of the Report described the strategy the District will follow to ultimately lead to detailed engineering plans, funding source identification and implementation schedules, all of which are required to be submitted to the Department in

the form of a long-term compliance permit application, pursuant to subsection 10 of the Act by no later than December 31, 2003.

INTRODUCTION

Chapter 11 of the *2001 Everglades Consolidated Annual Report* is intended to provide an update on the progress of the implementation of the ESP elements. The ESP elements have previously been identified as the District's water quality improvement strategies for Non-ECP tributary basins and structures discharging into, within or from the Everglades Protection Area.

To continue to fulfill Non-ECP permit requirements, the District has compared water quality data at Non-ECP structures from May 1, 1999 through April 30, 2000 to state water quality standards. The results of these water quality analyses are included in Appendix 11. A brief narrative summary of these analyses is provided in the Water Quality Analysis and Monitoring section below.

Chapter 11 of the *2000 Everglades Consolidated Report* included a map of the Everglades Stormwater Program hydrologic basins and Non-ECP structures. The map provided a wealth of regional information including urban and tributary boundaries for basins associated with the ESP program and the location of Non-ECP structures. **Figure 11-1** below is an update of the map included in last year's report. The map depicts the location of ESP structures, the boundaries of ESP hydrologic contributing basins, the Everglades Agricultural Area boundaries (regulated by Chapters 40E-61 and 40E-63 of the Florida Administrative Code), and the boundaries of the Everglades Protection Area. The external boundaries of the North New River and C-111 basins have been modified from last year's map to reflect the most accurate and updated information.

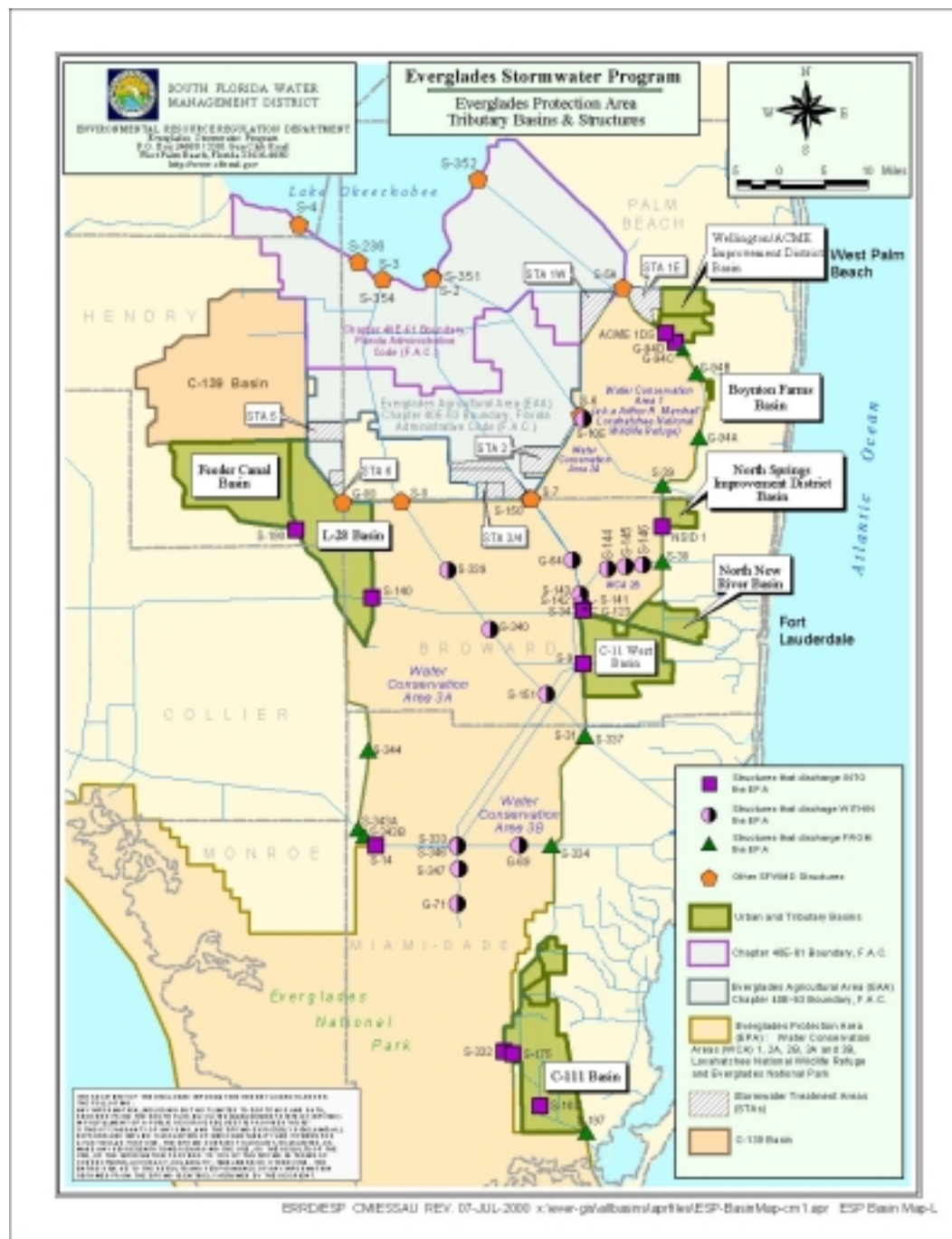


Figure 11-1. Tributary basins and water control structures and other features related to the Everglades Stormwater Program (ESP).

STATUS AND PROGRESS OF IMPLEMENTING ELEMENTS OF THE ESP

URBAN AND TRIBUTARY BASINS

Water Quality Analysis and Monitoring Programs

The Non-ECP permit authorized a comprehensive water quality monitoring program for over 250 constituents at 44 different structures. The major categories of constituent monitoring encompass physical parameters, nutrients, major ions, trace metals, pesticides in surface water and sediments and priority pollutants. The monitoring program is unprecedented in both size and scope, and will continue to provide a highly valuable resource for understanding water quality throughout the Everglades Protection Area. The accuracy of the data collected and the progress toward achieving and maintaining water quality standards will continue to be evaluated through annual data analysis and reported annually in Everglades Consolidated Reports (See Chapter 11 appendices).

Specific Condition 7 of the Non-ECP permit requires the District to first update the District's water quality database for Non-ECP structures and then evaluate these data based on a comparison to state water quality standards. This permit condition also requires the District to complete a second water quality data evaluation to update the first data evaluation by including the first 12 months of data collected since the issuance of the Non-ECP permit. Specific Condition 12 of the Non-ECP permit requires the District to continue to submit annual monitoring reports providing updates on water quality data and associated comparisons with state water quality standards. The data evaluations for the first and second reports (Specific Condition 7(a) and 7(b), respectively) were submitted as part of the Non-ECP permit's first annual report on April 20, 1999 (SFWMD, 1999a). The Non-ECP permit's second annual report was incorporated within various sections of the Everglades Consolidated Report (ECR) submitted January 2000 (SFWMD, 1999b).

The appendices to this chapter include an annual update of the Non-ECP permit monitoring program (Specific Condition 12) and a comparison of water quality data at Non-ECP structures to state water quality standards from May 1, 1999 to April 30, 2000 (Non-ECP third year's data). These comparisons fulfill Non-ECP permit requirements to document the accuracy of the data collected and to measure progress toward achieving and maintaining compliance with state water quality standards. The data evaluations (physical parameters, nutrients, major ions, trace metals) for the third annual report indicated that from May 1, 1999 to April 30, 2000, with the exception of dissolved oxygen, very few excursions from Class III water quality numeric criteria were found at Non-ECP structures. The quarterly surface water and biannual sediment pesticide sampling during this period indicated that only two detections were of concern related to surface water concentrations for diazinon and endosulfan (α plus β).

Table 11-1 below is a summary of flow-weighted mean total phosphorus concentrations at Non-ECP 'INTO' structures for the period from May 1, 1999 to April 30, 2000. As can be seen from the flow-weighted mean concentrations the phosphorus concentrations vary greatly between basins. The highest concentrations are from the ACME Basin B area. The North Springs Improvement District and C-11 West basins have concentrations below 50 $\mu\text{g/L}$. The only basin that has phosphorus concentrations below the potential default standard of 10 $\mu\text{g/L}$ is the C-111 basin.

Table 11-1. Annual flow-weighted mean TP concentrations and related information for INTO structures from May 1, 1999 to April 30, 2000.

Hydrologic Basin	Structure	Water Quality Station Id	Total Flow Volume (acre-feet)	Sample Size (Grab)	Number of Days with Positive Flow	Arithmetic Average (Grab)(µg/L)	Sample Size (Comp)	Sample Type	Total Samples/Samples During Flow	Flow-Weighted Mean Concentration (1) (µg/L)	Flow-Weighted Mean Concentration (2) (µg/L)
ACME (Basin B)	ACME1DS	ACME1DS	19,220 ^{2,6}	14	107 ^{2,6}	105	0	Grab ⁴	14/7	130 ⁷	153 ⁷
	ACME1	L40-1	ND ^{1,9}								
	G94D	G94D	19,790 ^{2,6}	14	104 ^{2,6}	109	0	Grab ⁴	14/8	122 ⁷	136 ⁷
	ACME2	L40-2	ND ^{1,9}								
North Springs Improv. District	NSID1	S-38B (WCA-2A near NSID1)	9,881	5	48	32	0	Grab ⁴	5/4	36	27
North New River	G-123	G123	ND ¹	11	ND ¹	17	0	Grab ⁴	11 ⁸	ND ¹	ND ¹
C-11 West	S-9	S9	273,612	49	213	16	39	Auto ⁵ & Grab ⁴	88/66	26	30
C-111	S-175	S175	97,537	46	190	7	0	Grab ⁴	46/22	8	8
	S-332	S332	199,949	47	316	8	0	Grab ⁴	47/33	8	7
	S-18C	S18C	193,256	26	334	8	0	Grab ⁴	26/23	9	8
L-28	S-140	S140	180,011	19	195	60	0	Grab ⁴	19/13	67	70
Feeder Canal	S-190	S190	97,586	18	197	71	0	Grab ⁴	18/12	111	110
Boynton Farms	ND ¹	ND ¹									

1) ND - no data available

2) Flow-weighted Mean Concentration Column (1) based on days of flow and monitored TP data only.

3) Flow-weighted Mean Concentration Column (2) based on estimation algorithm to determine TP concentration on non-flow days.

4) (Grab) indicates samples collected by grab sampling methodology.

5) (Auto) indicates that samples were collected by automatic composite samples.

6) Flow data from upstream pump structures, ACME1 and ACME2, is representative of the flow through these culverts.

7) Flow weighted mean concentrations for ACME1DS and G94D were calculated using the flow data at upstream structures ACME1 and ACME2.

8) Pumping records are not available.

9) Grab sampling discontinued at this location in January 1999 in favor of downstream site, autosampler installation pending for summer 2000.

Reporting Requirements

As required by Specific Condition 5 of the Non-ECP permit, the District is required to submit on an annual basis, a report that includes a description and evaluation of the implementation of strategies and schedules contained in the permit, as appropriate. The annual reports are also required to include the results of the evaluation of water quality data, updates on the implementation of the Regulatory Action Strategy and the Mercury Screening Program. Information contained in this chapter and in Chapters 2, 3, 4, 5, 6, 7, 8 and 10 of this report fulfill the reporting requirements of the Non-ECP permit as

detailed in the specific conditions of the Non-ECP permit. The requirements are listed below in **Table 11-2**.

Table 11-2. Non-ECP Permit Reporting Requirement

Specific Condition	Reporting Requirement	Location in Everglades Consolidated Report
4	New Permit or Permit Mods	Not Applicable at this Time
5	Submittal of Annual Report	Chapters 1, 4, 5, 6, 7, 8, 11, 12
6	Land Acquisition & Water Treatment Facility Status Update	Chapter 12
7	First & Second Data Evaluation Reports	Completed in 1998 Annual Report
8	Regulatory Action Report	Chapter 11
9	Update on Implementation of Schedules & Strategies	Chapters 1, 11
10	CompQAP	CompQAP 870166G (DEP Approved)
11	Mercury Screening Program Report	Chapter 7
12	Annual Report Requirements	Chapters 4,11, Appendix 11-1
12(b)	Dates of Sampling	Appendix 11-10
12(c)	Water Quality Sampling Methodology	CompQAP 870166G (Sec's 6.0 & 7.0)
12(d)	Map of Sampling Locations	Chapter 11, Figure 11-1
12(e)	Statement of Sampling Authenticity	Appendix 11-3
12(f)	CompQAP	CompQAP 870166G
12(g)(I-v)	Water Quality Data & Associated Information	Appendix 11-2
12(g)(iv)	Monthly Flow Volumes	Appendix 11-1a
12(h)	Water Quality Data Evaluation	Appendix 11-1
12(i)	Recommendations for Improving WQ Monitoring	Completed in 1998 Annual Report
12(j)	Implementation of Strategies	Chapters 1, 4, 5, 6, 7, 8, 11, 12
16	Monitoring Locations Report	Submitted to FDEP in 1998
19	Additional Strategies (if Developed)	Not Applicable at this Time

In addition to the required reports, the District has prepared several informational products that discuss different aspects of the Everglades Program. The District has produced a document titled the *Everglades Stormwater Program*, January 2000. The document provides a summary of the various elements that make up the ESP. The District's ESP staff may be contacted to obtain literature and other media on the ESP and the Everglades Program.

Regulatory Action Strategy

The status of the Regulatory Action Strategy (RAS), which applies to all basins discharging into the Everglades Protection Area but are not part of the Everglades Construction Project, is updated and submitted annually to the Florida Department of Environmental Protection. A detailed description of the RAS and the 10-step approach to addressing basin specific water quality issues can be found in Chapter 11 of the *2000 Everglades Consolidated Report*.

Steps 1-3 of the RAS require an inventory of all structures directly discharging into the Everglades Protection Area (step 1), the characterization of available water quality data (step 2) and, when needed, an expanded monitoring program at structures discharging into the Everglades Protection Area (step 3). At the time of this update, steps 1 through 3 of the RAS have been completed for all basins, with the exception of steps 2c and 3 in the Boynton Farms basin. The District is presently formulating a monitoring plan for Boynton Farms and is coordinating agreements for access to all relevant private properties. Step 4 (evaluating data from direct structures) is ongoing as additional sources of historical data are being investigated. District staff had, ahead of schedule, analyzed all of the District's data available since 1978 and presented it as part of the Non-ECP permit's first annual monitoring report on April 20, 1999 (SFWMD, 1999a). Autosampling equipment for flow proportional TP sampling has been installed for the Wellington/ACME, North Springs Improvement District and C-11 West basins. Autosampling equipment for time composite TP sampling has been installed for the North New River, L-28, and Feeder Canal basins. Additional equipment, necessary for flow proportional TP sampling, is anticipated to be installed this year for these basins and the C-111 basin.

Step 6 requires the identification of structures upstream of the direct structures with potential water quality concerns and has been completed for all basins. The basins are at varying stages of Steps 5, 7 and 8. The District has executed cooperative/cost share agreements with local governments for upstream water quality monitoring within the Wellington/ACME, North Springs Improvement District and the C-11 West basins. Additional agreements are being pursued within these and other basins. District personnel are conducting upstream sampling within the C-111, L-28 and Feeder Canal basins.

Implementation of water quality improvement plans, including BMPs and operational modifications, have been partially initiated in the L-28, Feeder Canal, C-11 West, and Wellington/ACME basins (See the Basin by Basin Update of Activities section of this chapter for more detailed information on each basin).

Water Quality Improvement Plans

In Fiscal Year 2000, the District began a process that will lead to the development of basin-specific feasibility studies/conceptual designs for tributary basins discharging into the Everglades Protection Area. The activities associated with this effort include five Non-ECP basins and all basins associated with the Everglades Construction Project. The goal of this effort is to provide feasibility studies and conceptual designs that identify the best combination of Best Management Practices (BMPs), optimized Stormwater Treatment Areas (STAs), and Advanced Treatment Technologies needed to meet the final water quality and water quantity objectives for the benefit of the Everglades (see Chapter 1 for overall strategy). The feasibility studies integrate information from ongoing Stormwater Treatment Area design, construction and operation, research, regulation and planning studies. In the last year, baseline data sets for all the basins included in the basin-specific feasibility studies were compiled. A schedule for completion of feasibility study milestones is being revised and will be provided in next year's report.

Agreements with local stakeholders (municipalities and water control districts) within the C-11 West, North Springs Improvement District and the Wellington/ACME basins have been executed requiring the local stakeholders to develop and implement BMPs where feasible. The District will provide in-kind services, expertise and funding to aid these initiatives. Additional agreements and coordination with landowners in other basins are being pursued. Upstream water quality monitoring data being collected, which will help determine the location and type of BMPs that should be implemented.

The Comprehensive Everglades Restoration Plan (CERP) includes several components that will have a direct impact on the activities of the ESP. Staff from ESP have coordinated and contributed to the Water Preserve Area (WPA) Feasibility Study, which is optimizing designs and performance for many of the components of CERP based on more detailed groundwater models. Specifically, ESP staff, in coordination with local governments, has emphasized enhancements to WPA components that divert discharges from Non-ECP basins to treatment and storage facilities. In addition to the WPA Feasibility Study, ESP staff is coordinating with ECP research staff on Advanced Treatment Technologies to determine the applicability in the Non-ECP basins and the WPA components.

The District has embarked on a study designed to begin characterization and quantification of the atmospheric transport of applied pesticides during and in the absence of weather events. If the results of the first phase of the study (scoping), scheduled through Fiscal Year 2001, demonstrate that pesticides are being deposited in sufficient quantities to affect water quality in Lake Okeechobee, the Everglades, and/or Florida Bay, follow-up studies will refine the estimate of the contribution of atmospheric deposition to the pesticide mass budgets for these waters. A scoping-level model will also be used to evaluate the potential long-term impacts on water quality in these areas. If the second phase of this study suggests that atmospheric deposition of pesticides is degrading water quality substantially, then a recommendation could be made to the appropriate farming community to target aerial best management practices. Information regarding the actual concentrations and trends can be used to determine ecological significance and therefore environmental and legal risks.

The District has also embarked on a sediment bioassay and toxicity identification and evaluation project. The objective of this study is to determine metal/pesticide/PAH/PCB

concentrations in sediment at selected District structures (based on historical sediment and surface water quality data and selected areas of concern). Utilizing the data, numerical sediment criteria gaps will be filled-in and used to guide cleanup and upstream best management practices program development. The sediment toxicity bioassay identification/evaluation (TIE) protocols are being developed under District contract No. C-11725 with Florida International University (FIU). Preliminary sampling began in July 2000, results are expected to be provided later in 2000. Using collected data and recently developed sediment toxicity protocols, the study will also determine if there is a toxic threat to the freshwater aquatic organisms.

Financial Assessments

A conceptual methodology for calculating a financial assessment based on the benefit each parcel may receive, has been developed and is under review. In addition, GIS mapping for parcel identification and information in the Wellington/ACME Improvement District basin is near completion and additional mapping has been initiated in the North Springs Improvement District and C-11 West basins. A comprehensive review of funding sources is also currently underway for Everglades restoration activities without dedicated sources of revenue. This review includes policy issues and decisions regarding the sources of revenue. It is unclear how this financial assessment will fit into these policy decisions, if at all. While these issues are being resolved, mapping within the basins will continue, as well as technical and policy review of the calculation methodology.

Public Outreach Initiatives

The public involvement campaign has expanded considerably in the past year. The current campaign includes a new website, the development of a Best Management Practices Manual, and various activities in the C-11 West basin, the ESP pilot basin for public involvement activities.

The Web site will be completed in the near future and will include basin information such as maps, publications, photos, project information and basin program updates. The ESP has completed a summary document describing the program in layman's terms, a copy may be found at the District's web site in pdf format:

<http://www.sfwmd.gov/org/reg/evg/espsum/espsum2000.pdf>

Another significant publication being prepared is the Best Management Practices Manual. The manual will discuss sources of pollutants, targeting and quantifying pollutant types, and methods for selecting feasible BMPs. A key goal of the manual is to provide information on structural and non-structural BMPs for urban land uses.

Several public involvement pilot activities are being implemented in the C-11 West Basin. The activities include a variety of strategies aimed at educating stakeholders and the public to implement changes that will result in enhanced water quality and reduced phosphorus content in the stormwater discharges.

One of the activities is working with the pesticide and fertilizer industries. To apply pesticides, lawn maintenance and landscaping professionals must participate in year-round training to renew their licenses. The Florida Department of Agriculture and Consumer Services, the Broward County Agriculture and Extension Division, and

professional trade organizations offer these continuing education courses. Presentations of about 10 minutes will be given before each Continuing Education Class by District staff in conjunction with other organizations. The pesticide and fertilizer industry is working closely with the District to develop fertilizer and irrigation BMPs applicable to the C-11 West Basin. The District will communicate these BMPs to the public in several ways, including distribution of information through local retail businesses.

Another public involvement activity is The Freddy's Friends Club piloted at Silver Ridge Elementary. The activity will be expanded to three additional elementary schools per year within the Western High School and Cooper City High School innovation zones. Central Broward Water Control District staff will help coordinate the schedule of activities for each Freddy's Friends Club in cooperation with District staff.

The program is also planning to post a total of 10 signs interpreting and promoting water quality protection at District canals and structures along the C-11 Canal. The interpretive signs will be simple in design to provide neighborhood enhancement and add to the local color of communities within the basin. All of the signs will feature "Freddy the Alligator."

AGRICULTURAL BASINS

A significant component of efforts to improve the quality of water discharging into the District's water management system and entering the Everglades Protection Area is an effective regulatory program, known as Chapter 40E-63, F.A.C. Urban and Agricultural Best Management Practices (BMPs) are the source-control cornerstones toward attaining this objective. In addition to the urban basins described in this chapter, the agricultural basins, including the Everglades Agricultural Area (EAA) and C-139 Basins, are being monitored for water quality through the regulatory program. This section provides the status of this program for the agricultural areas. For additional information, the District's Everglades Regulation Department publishes an annual report providing greater detail of the program components and data evaluation.

Everglades Agricultural Area (EAA) BMP Reporting

The goal of the BMP Regulatory Program for the Everglades Agricultural Area is a 25 percent reduction in phosphorus load from the EAA farms, cities and industry to the Everglades Protection Area. The reduction is determined by comparing phosphorus discharges from the District structures at the end of each 12-month water year (May 1 through April 30) with the pre-BMP Base Period (October 1, 1978 through September 30, 1988) adjusted for hydrologic variations. The Rule requires the District to evaluate the general trends in phosphorus load reduction on an annual basis. Based on this assessment, the EAA Basin has been in compliance since the first full year of BMP implementation (Water Year 1996).

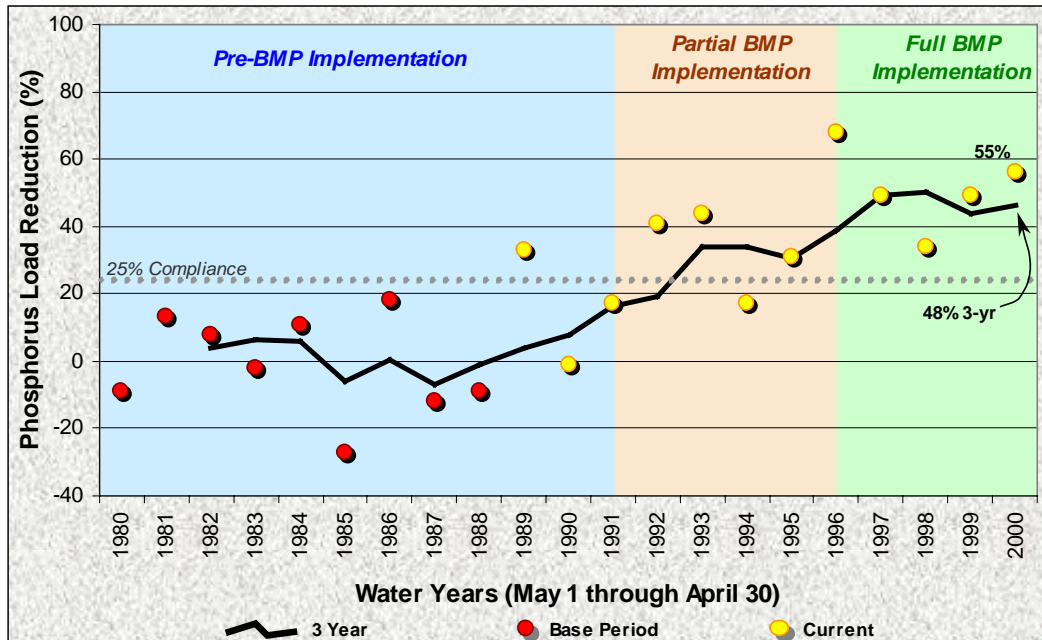


Figure 11-2. Compliance conditions became effective in 1996 at which point full BMP implementation was established. During this period the EAA has met the 25% total phosphorus reduction criteria as required by Rule 40E-63.

The relative difference between the Water Year 1999 (WY99) measured phosphorus quantity and the predicted Base Period phosphorus quantity (adjusted for rainfall) indicates a 49 percent reduction in phosphorus load. The same comparison with the Water Year 2000 (WY2000) data indicates a 55 percent load reduction. The 3-year cumulative phosphorus load reduction from the EAA reported for WY99 is 44 percent (with a 3-year cumulative total phosphorus concentration of 107 ppb as compared to 173 ppb prior to BMP implementation). The 3-year cumulative phosphorus load reduction from the EAA reported for WY2000 is 48 percent (with a 3-year cumulative total phosphorus concentration of 114 ppb). Most important to note is that the 3-year trend accounts for the percent reduction in phosphorus load entering the Everglades Protection Area from the Everglades Agricultural Area. It does not, however, account for the phosphorus loads entering the Everglades Agricultural Area from other sources including Lake Okeechobee releases, C-139 Basin, Non-ECP basins and Stormwater Treatment Area (STA) discharges.

The phosphorus load discharged from the Everglades Agricultural Area to the Everglades Protection Area in Water Year 1999 (with BMPs implemented) was 128 metric tons compared with the 249 metric tons predicted with WY99 adjusted rainfall from the Base Period. The results for Water Year 2000 indicate a phosphorus load of 193 metric tons. The WY99 total phosphorus concentration was 124 ppb. WY2000 statistics reveal a total phosphorus concentration of 119 ppb.

For the fifth full water year of BMP implementation in the EAA, the results show a continuing trend of phosphorus reduction in discharges to the Everglades Protection Area. With encouraging preliminary WY2000 data, initial successful performance of the functional Stormwater Treatment Areas (STAs), and the anticipated continued results

over the next few years, the Everglades Forever Act's interim goal of 50 ppb phosphorus concentration appears to be an attainable target.

C-139 Basin BMP Rule Development

One goal of the Act is to ensure that the historical average annual phosphorus load not be exceeded from the C-139 Basin. In WY99, the C-139 Basin alone was responsible for 34 tons of phosphorus entering the Everglades Protection Area, of which at least 5 tons passed through the Everglades Agricultural Area. Preliminary results for Water Year 2000 indicate 53 tons attributable to the C-139 Basin.

The District is developing rules to establish the compliance methodology and actions required by landowners in the C-139 Basin if the phosphorus load limitation of the basin is exceeded. In brief, the proposed methodology will compare the current annual phosphorus load in runoff that is attributable to the C-139 Basin with a statistical prediction of the Base Period phosphorus load (adjusted for hydrologic variations), similar to the EAA Basin. BMP development and implementation procedures will also be addressed. The estimated timeframe for Rule adoption is early 2001.

PROGRAM MANAGEMENT AND IMPLEMENTATION

BASIN BY BASIN UPDATE OF ACTIVITIES

Wellington/Acme Improvement District Basin

The cooperative/cost-share agreement that revised Wellington's water quality monitoring program discussed in last year's report has been implemented. This program includes installation of autosamplers at Acme Pump Stations 1 and 2 (**Figure 11-3**) for flow proportional TP sampling, upstream grab samples at representative land use sites, and sampling during flow events rather than sampling monthly regardless of flow.

An additional cooperative agreement between Wellington and the District was executed on May 23, 2000 for implementation of a water quality improvement plan. The plan includes implementation of BMPs, operational changes in the local water management system, and development of an alternate water preserve area plan in the Basin B area. As a result of this agreement, the Village of Wellington has created a BMP ordinance that addresses the storage, handling and transport of livestock waste and the storage and application of fertilizer. The ordinance includes an educational component on the proper use of fertilizers and irrigation practices.

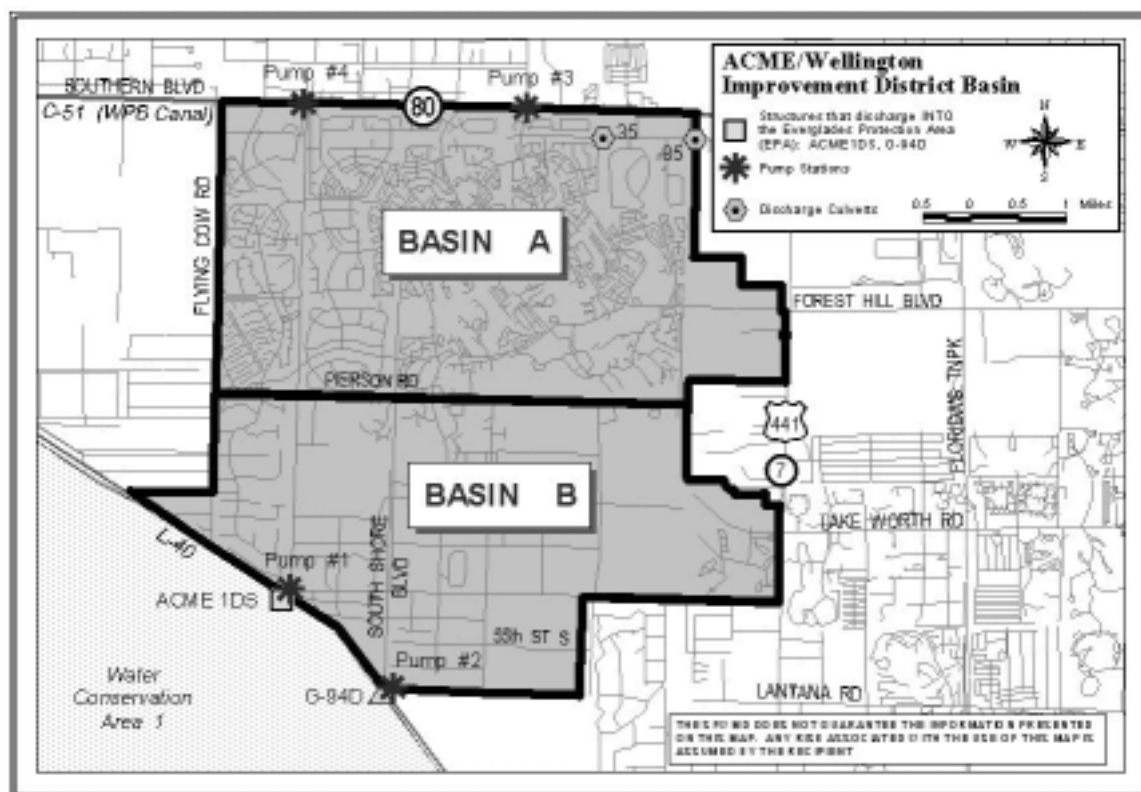


Figure 11-3. Wellington/Acme Improvement District Basin

Two areas of land are identified in the CERP component for Basin B (**Figure 11-3**) for treatment and storage areas (Sections 24 and 34). These areas were added to the Save Our Rivers (SOR) list for potential acquisition. Section 24 (approximately 310 acres just west of Basin B) has been acquired by the District and is currently being leased for agricultural use. Section 34 (approximately 640 acres in the southeast corner of Basin B) is scheduled for appraisal for potential acquisition in the next two years.

ESP staff has coordinated with ECP research staff and Wellington to implement a Chemical Treatment and Solids Separation (CTSS) pilot study within Basin B (located at Acme Pump Station 2 near G-94D). The pilot study trailer being used is one of the same trailers used for the CTSS pilot study done in the ENR. This pilot study is being conducted to determine the feasibility for chemical treatment of stormwater in a more urban basin. The study is being conducted through a contract with the same consulting firm that is finalizing the CTSS study in the ENR and will be consistent with the “standard of comparison” for advanced treatment technologies in the EAA.

Boynton Farms Basin

Letters were sent to all landowners in Boynton Farms Basin (**Figure 11-4**) to inform them of the impending water quality requirements for the Everglades Stormwater Program. Also, a meeting was held with representatives for two of the individual landowners and the Executive Director of the Lake Worth Drainage District. Since then, District personnel have performed several water quality sampling runs of surface waters in the area. Sampling during flow conditions is not yet available. The overall basin boundaries have been finalized, however, certain property boundaries are in dispute. Due to high water table and overgrown vegetation on the west side of the basin (the Arthur R. Marshall Loxahatchee National Wildlife Refuge side), some sampling locations are still inaccessible. In these areas, access must be provided from the farm side. The District is continuing to work with each of the landowners and offering technical support to help them comply with water quality requirements.

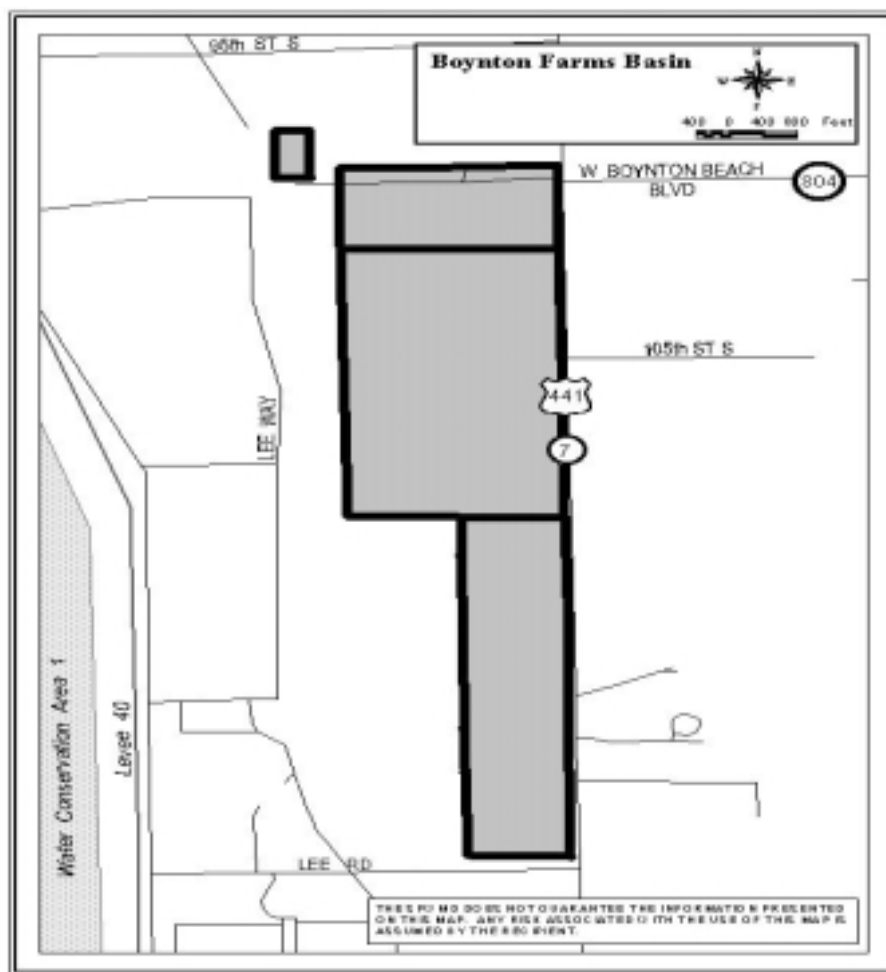


Figure 11-4. Boynton Farms Basin

North Springs Improvement District Basin

During the past year, the basin boundary and sub-basin boundaries have been verified and a revised basin map is included (**Figure 11-5**). Upstream structures and flow regimes have been identified. As part of a cooperative/cost-share agreement between the District and North Springs Improvement District, a revised basin-wide water quality monitoring program, with several upstream sampling locations, is being implemented. Also, as required as part of this agreement, an autosampler and flow monitoring equipment with telemetry will be installed at NSID Pump Station #1.

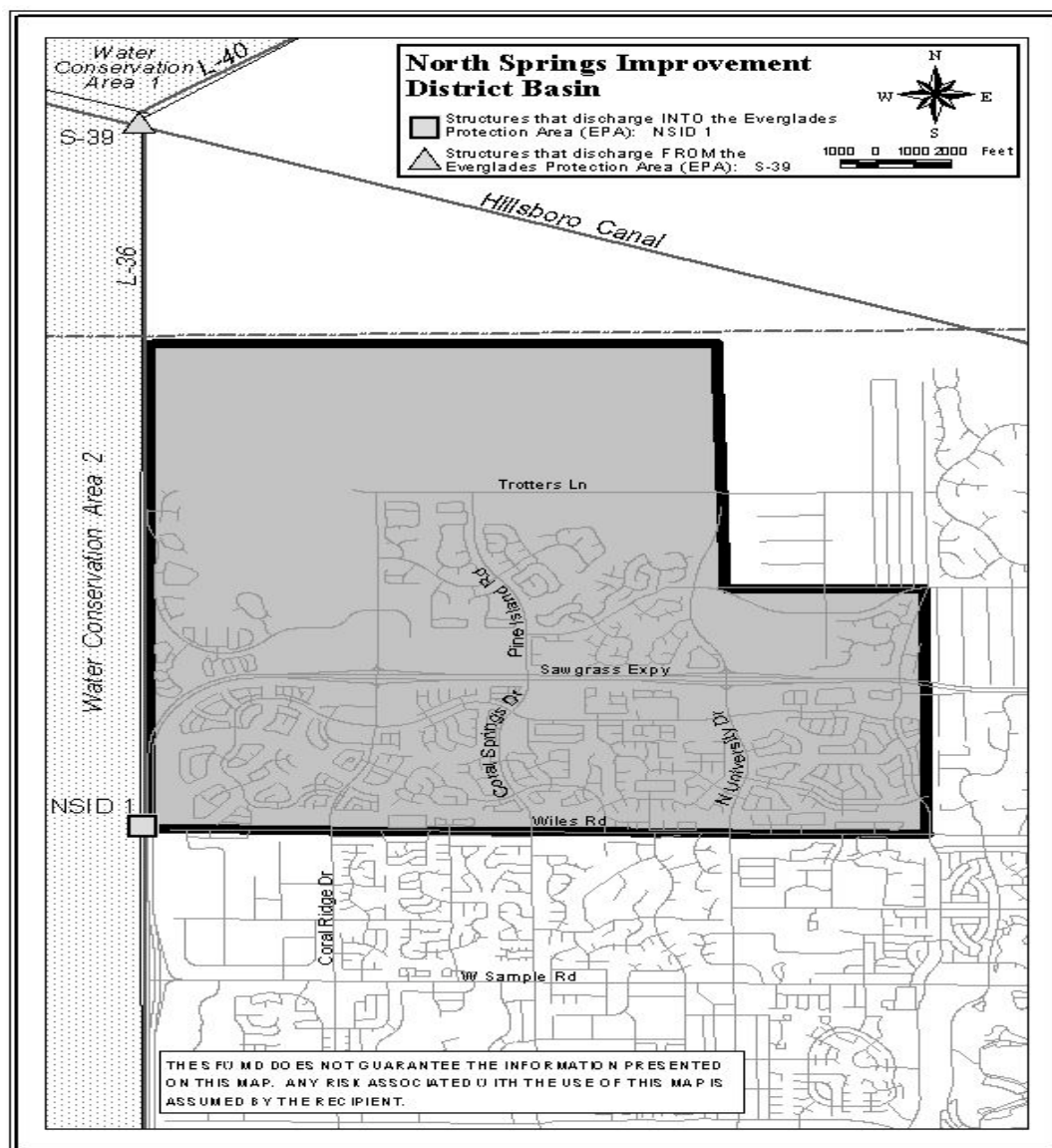


Figure 11-5. North Springs Improvement District Basin

North New River Basin

During the past year, the North New River Basin boundary was further investigated and revised (**Figure 11-6**). Also, all sub-basin boundaries have been delineated as well. Efforts are underway to obtain and review all upstream water quality data available for these areas. All upstream structures with primary discharges have been identified and mapped. Based on the results of the water quality assessment, a comprehensive upstream water quality monitoring program may be instituted. An autosampler with time composite sampling has been installed at the G-123 structure. Additional equipment necessary for flow proportional sampling and flow monitoring with telemetry is scheduled for installation at the G-123 structure this year. A cooperative agreement with the Old Plantation Water Control District is being developed to implement water quality monitoring and improvement programs.

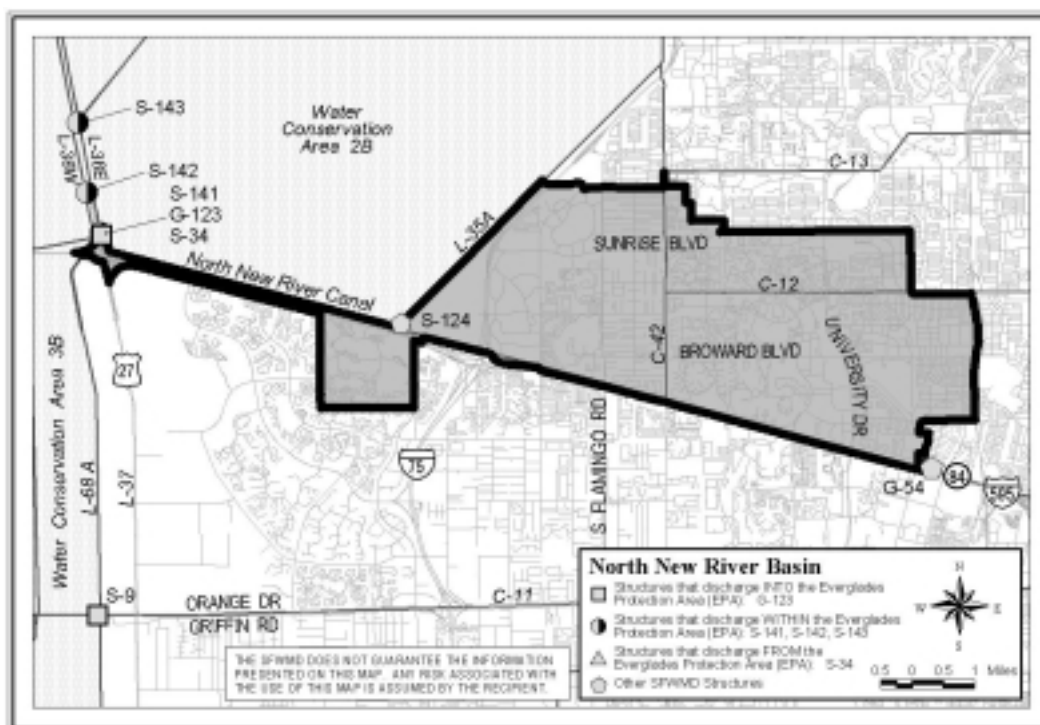


Figure 11-6. North New River Basin

C-111 Basin

The RAS continues to be implemented in the C-111 Basin. The basin boundary has been modified slightly (**Figure 11-8**). With the operation of the U.S. Army Corps of Engineer's pump station S-332D, the Technical Oversight Committee (TOC) has determined the need to include this structure when computing compliance of waters entering Everglades National Park. TOC members will continue to discuss issues relevant to this subject and direct staff accordingly.

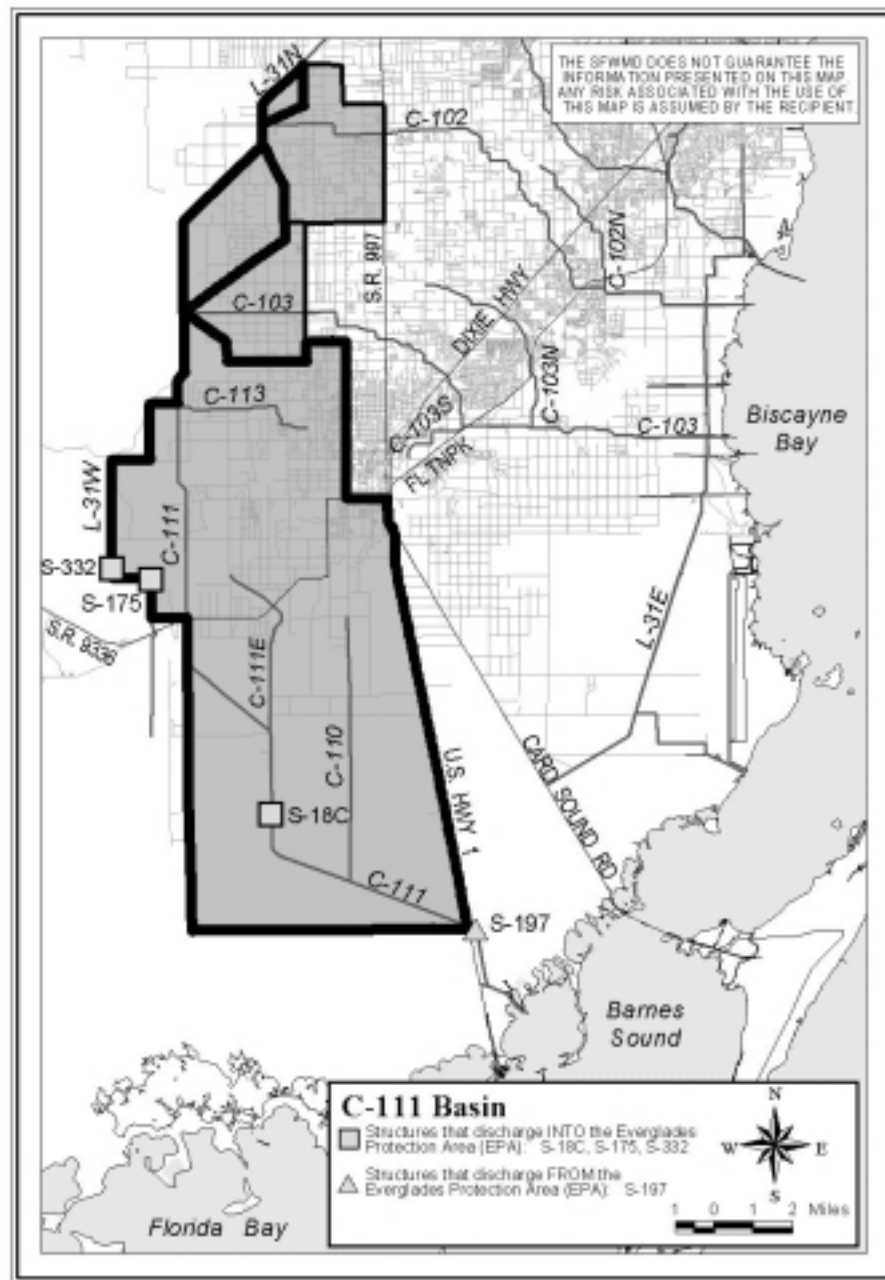


Figure 11-8. C-111 Basin

Nine existing culverts, owned and maintained by the District, were identified between S-18C and S-197. These culverts have the potential of hydraulically connecting the marshes on the north side of the C-111 to the canal in the area where spoil mounds were degraded along the southern bank in 1997. District staff is reviewing and evaluating historic water quality data in the area and will make recommendations to modify the existing water quality monitoring plan to capture these structures accordingly.

District staff has completed the inventory of existing permits and is preparing a GIS map. In addition, staff is coordinating with Miami-Dade DERM to obtain a GIS map for permits issued under delegation authority by that agency and all data files for ground and surface water quality and sediment samples from their monitoring program. There have been no additional sources of adequate water quality data to determine compliance at any upstream structures.

The District continues to monitor and characterize data for upstream basin structures. District staff has determined the current flow data to be inadequate for calculating flow weighted mean concentrations at S-178 and will make recommendations for improving the quality of flow data. In addition, the water quality monitoring program will be modified to capture pesticides in the region.

The water quality supplement to the C-111 General Reevaluation Report (GRR) being developed by the U.S. Army Corps of Engineers (Corps) will be completed to meet water quality objectives. Work associated with the implementation of the C-111 Water Quality Strategy will be cost shared equally by the Corps and the District. The results of year 2000 operations and monitoring will be used to complete the Interim Operating Plan (IOP), now under development, which will carry protective measures through the year 2003, or until the Modified Water Deliveries and C-111 projects are complete.

Understanding the effectiveness of the RAS in the C-111 Basin requires knowledge of the pathways and quantities of surface water and ground water transport. The District has contracted with the University of Miami to collect information on ground water. To date, this study has shown that saltwater intrusion from Florida Bay at a depth of greater than 20 feet extends between six and ten km from the Bay shoreline. Freshwater discharge from the surficial aquifer toward Florida Bay has been difficult to measure, but horizontal seepage velocities in adjacent Taylor Slough are roughly 0.5 to 1.3 km/y toward the Bay. Groundwater discharge may also include some water from deeper aquifers; based on concentrations of chemical tracers, it appears that upwelling from the Hawthorn Formation into the surficial aquifer occurs near S-175.

The C-111 system modifications are winding up a three-year period of construction activity with the replacement of the Taylor Slough Bridge in Everglades National Park.

Scientists at the Homestead-based Tropical Research and Education Center (IFAS) are preparing a final report concluding three years of field investigations on vegetable and fruit crops cultivated in the unique soil conditions of the South Miami-Dade County region. Project activities include fertilizer trials, innovative methods of conducting groundwater nutrient analyses, using this information to customize irrigation schedules and public education activities to transfer these new techniques to area growers.

Emergency actions to protect the Cape Sable seaside sparrow strongly influenced C-111 system operations through 2000. Starting this year, the biological opinion issued by U.S. Fish and Wildlife Service (FWS) established water management targets for the eastern populations of the sparrow located on the edge of Everglades National Park next to the C-111 canal and the L-31N Canal. Hydrologic targets were to be attained through the operation of S-332D and a new, temporary facility in the Rocky Glades at the S-332B location. Emergency operations and monitoring of water quality at these two structures was authorized by the Department to the USACE. A final data summary report of the S-332D pump test, conducted from August 30, 1999 to September 27, 1999 is undergoing internal review and comment and will be submitted in accordance with the test pumping authorization obtained from the Department.

L-28 Basin

A time composite automatic sampler has been installed at the S-140 structure (**Figure 11-9**) and will be upgraded to a flow proportional sampler this budget year. Upstream discharge structures have been identified and mapped in GIS format. Land uses that discharge and contribute surface water to each site have been inventoried along with the site/structure dimensions and landowner information. Staff is conducting an on-going inner-basin grab sample survey to isolate areas where phosphorus concentrations may be higher in surface water. District staff have held cooperative informational exchange meetings with the Seminole and Miccosukee Indian Tribes, who are the two largest landowners within the basin. ESP staff is coordinating with an inter-agency group working on the operational schedule for the new G-409 pump station that provides “entitlement” irrigation water supply from the EAA to the Seminole Reservation. This structure will be instrumented with flow-proportional autosampling equipment.

The District has partnered with NRCS and is conducting strategy seminars and developing educational components to assist local landowners in developing conservation plans and voluntarily implementing on farm BMPs.

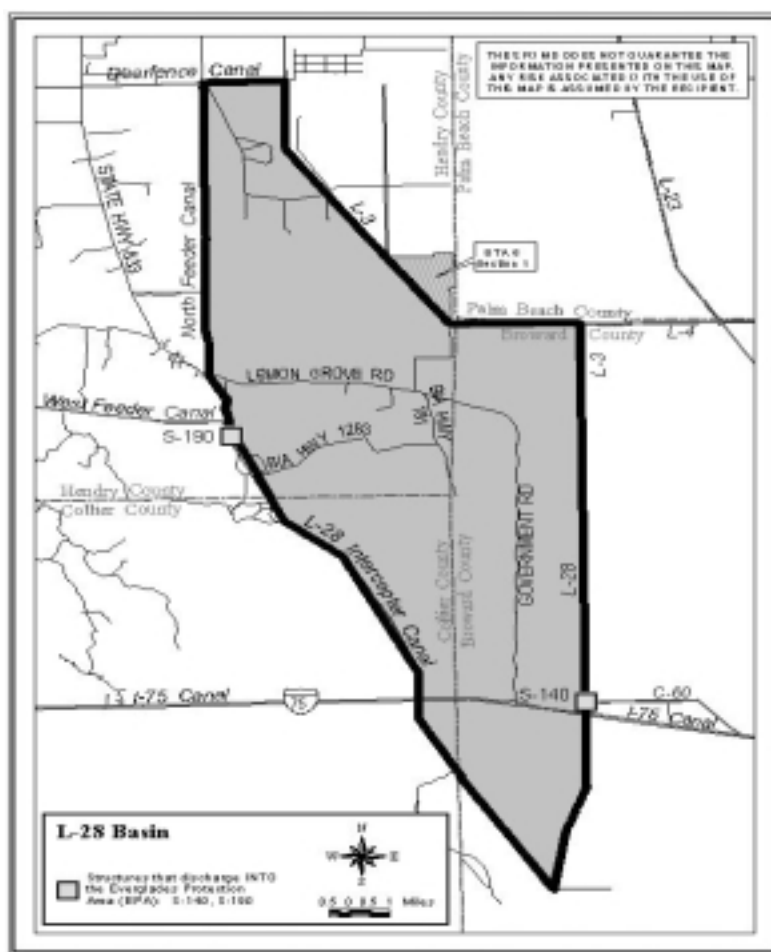


Figure 11-9. L-28 Basin

Feeder Canal Basin

A time composite automatic sampler has been installed at the S-190 structure (**Figure 11-10**) and will be upgraded to a flow proportional sampler this budget year. District efforts continue to improve the water quality and flow data at upstream structures WWEIR and NFEED. Structures upstream of NFEED and WWEIR have been identified, measured, photographed, and a revised GIS map has been generated. Land uses that discharge and contribute surface water to each site have been updated along with the site/structure dimensions and landowner information.

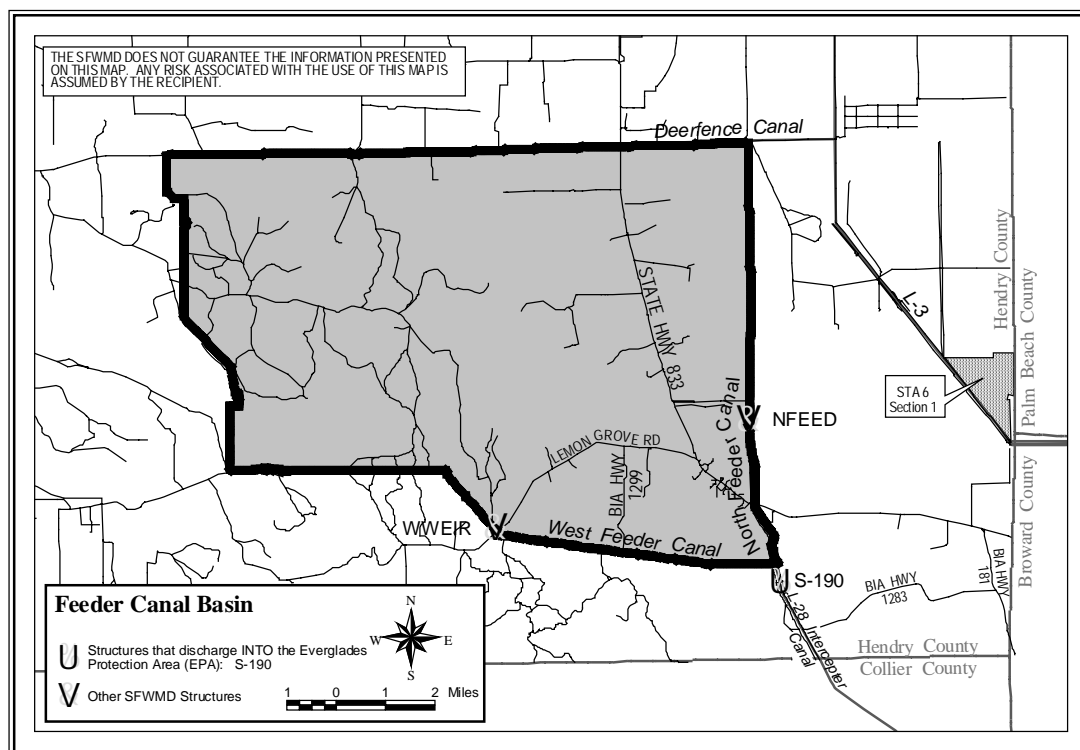


Figure 11-10. Feeder Canal Basin

Upstream of NFEED, project discharges from McDaniel Ranch continue to be monitored and submitted to the District for review and to determine compliance with the Landowner Agreement and permit conditions. During Water Year May 1, 1998 to April 30, 1999, McDaniel Ranch failed to achieve the compliance target of 50 ppb (TP of 516 ppb). The Landowner Agreement required McDaniel Ranch to re-assess its BMP plans and begin to investigate sources of water, which may be higher in total phosphorus. Additional strategies and BMPs were then implemented in coordination with District staff. From May 1, 1999 through November 10, 1999, the overall flow weighted phosphorus for McDaniel Ranch's North Feeder discharge was 242 ppb. In addition, construction of detention basins in Phase #1 of the project is complete.

District staff is conducting an ongoing grab sampling survey in the Fry Sub-Basin to determine the effectiveness of the BMPs implemented. Also, upstream of WVEIR, areas are currently being re-investigated using water quality grab sampling to further locate potential “hotspots” or sources of higher phosphorus in this sub basin.

The District has partnered with the National Resource Conservation Service (NRCS) and is conducting strategy seminars and developing educational components to assist local landowners in developing conservation plans and voluntarily implementing farm BMPs.

FINDINGS

The District’s water quality monitoring program, (implemented as a result of the Everglades Forever Act and the Non-ECP permit) indicates that the quality of water discharging into the Everglades Protection Area is generally acceptable with the exception of phosphorus concentrations discharging from the Wellington/ACME, Feeder Canal and L-28 basins. However, with a potential phosphorus numerical standard of 10 ppb, any basin not meeting this standard will be required to implement appropriate water quality improvement measures. To better characterize the quality of water discharging into the Everglades Protection Area, the District has begun a plan to install flow proportional automated samplers at all “INTO” structures.

After cursory reviews of existing water quality monitoring programs upstream of the direct “INTO” structures, it appears necessary to revise existing programs and implement new programs where none exist to better characterize water quality within the basins. Revised monitoring programs within the Wellington/ACME, C-11 West, and North Springs Improvement District basins have been or are being implemented. Recommendations for implementation of new water quality programs and revisions to existing programs are also being developed in other basins. Concurrently, the District will continue to monitor water quality in accordance with the Non-ECP permit, to measure progress toward achieving compliance with state water quality standards.

To achieve the goals/requirements of the Everglades Forever Act, the Non-ECP permit and the future long-term compliance permit, extensive coordination with local governments, 298 districts, Miccosukee and Seminole Indian Tribes and other state and federal agencies is essential. Several meetings have been conducted to foster this coordination within all the basins. Several cooperative/cost share agreements with local governments have been executed to implement water quality improvement plans consisting of Best Management Practices and operational modifications. The public involvement element of ESP will provide additional avenues of participation for environmental groups, agricultural and urban communities, locally impacted industries, and the general public. Coordination with CERP, the WPA Feasibility Study, ongoing critical projects within Non-ECP basins, the Basin-Specific Feasibility Study, and local governments is facilitating the development of long-term solutions for achieving state water quality standards.

Best Management Practices implementation has resulted in total phosphorus loading reductions in full compliance with the 25 percent mandated in the Act. The total cumulative load of total phosphorus discharged from the Everglades Agricultural Area since the required implementation of BMPs is 55 percent lower than the load that would

have occurred without BMPs. The total phosphorus load reduction represents a decrease of phosphorus from EAA farms, cities and industries. The most recent three-year cumulative total phosphorus reduction is 48 percent. The calculations do not equate to equivalent percent reductions of the total phosphorus entering the Everglades Protection Area from other sources passing water through the EAA such as Lake Okeechobee releases, C-139 basin, Non-ECP basins and STA discharges.

LITERATURE CITED

The Non-ECP Structures First Annual Monitoring Report submitted to the Florida Department of Environmental Department pursuant to EFA permit No. 06, 502590709, SFWMD, 1999a

The Non-ECP Structures Second Annual Monitoring Report submitted to the Florida Department of Environmental Department pursuant to EFA permit No. 06, 502590709, SFWMD, 1999b

Everglades Consolidated Report, 2000, South Florida Water Management District, West Palm Beach, FL (SFWMD, 2000).